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We claim:

1. A DNA sequence comprising the coding region of a plant GMP synthetase, wherein this DNA sequence has the nucleotide sequence SEQ-ID No: 1 or SEQ-ID No: 3.

2. A DNA sequence which hybridizes with the DNA sequence SEQ-ID No: 1 or SEQ-ID No: 3 as claimed in claim 1 or parts thereof or derivatives derived from these sequences by insertion, deletion or substitution, and codes for a protein which has the biological activity of a GMP synthetase, this DNA sequence having a homology of at least 60% with SEQ ID NO: 1.

3. A protein having GMP synthetase activity and comprising an amino acid sequence which represents a portion of at least 100 amino acids of the sequence SEQ-ID No: 2 or 4.

4. A protein as claimed in claim 3, which comprises as amino acid sequence the part-sequence 50 - 300 from SEQ-ID No: 2 or SEQ-ID No: 4.

5. A protein as claimed in claim 4, which comprises as amino acid sequence the sequence depicted in SEQ-ID No: 2 or SEQ-ID No: 4.

6. The use of a DNA sequence as claimed in claim 1 or 2 for introduction into pro- or eukaryotic cells, this sequence optionally being linked to control elements which ensure transcription and translation in the cells, and leading to expression of a translatable mRNA which brings about the synthesis of a plant GMP synthetase.

7. The use of a DNA sequence as claimed in claim 1 or 2 for producing an assay system for identifying inhibitors of plant GMP synthetase with a herbicidal action.

8. A method for finding substances which inhibit the activity of plant GMP synthetase, which comprises in a first step using a DNA sequence as claimed in claim 1 or 2 preparing GMP synthetase, and in a second step measuring the activity of the plant GMP synthetase in the presence of a test substance.

9. A method as claimed in claim 8, wherein the measurement of the plant GMP synthetase is carried out in a high throughput screening (HTS).

10. A method for identifying substances with a herbicidal action, which inhibit the GMP synthetase activity in plants, consisting of

a) preparation of transgenic plants, plant tissues, or plant cells which comprise an additional DNA sequence coding for an enzyme having GMP synthetase activity and are able to overexpress an enzymatically active GMP synthetase;

b) application of a substance to transgenic plants, plant cells, plant tissues or plant parts and to untransformed plants, plant cells, plant tissues or plant parts;

c) determination of the growth or survivability of the transgenic and untransformed plants, plant cells, plant tissues or plant parts after application of the chemical substance; and

d) comparison of the growth or survivability of the transgenic and untransformed plants, plant cells, plant tissues or plant parts after application of the chemical substance;

where suppression of the growth or survivability of the untransformed plants, plant cells, plant tissues or plant parts without, however, greatly suppressing the growth or the survivability of the transgenic plants, plant cells, plant tissues or plant parts demonstrates that the substance from b) shows herbicidal activity and inhibits the enzymic activity in plants.

11. An assay system based on the expression of a DNA sequence SEQ-ID No. 1 or SEQ-ID No. 3 as claimed in claim 1 or 2 for identifying inhibitors of plant GMP synthetase with a herbicidal action.

12. An assay system as claimed in claim 11 for identifying inhibitors of plant GMP synthetase, wherein the enzyme is incubated with a test substrate to be investigated and, after a suitable reaction time, the enzymatic activity of the enzyme is measured by comparison with the activity of the

uninhibited enzyme.

13. An inhibitor of plant GMP synth tase.

14. An inhibitor of plant GMP synthetase identified using an assay system as claimed in claim 11 or 12.

15. An inhibitor as claimed in either of claims 13 or 14 for use as herbicide.

16. A method for eliminating unwanted plant growth, which comprises treating the plants to be eliminated with a compound which specifically binds to GMP synthetase encoded by a DNA sequence as claimed in claim 1 or 2, and inhibits the function thereof.